

## CLAIMS

1. A method of joining dissimilar materials, said method comprising the steps of:
  - driving a welding member through at least a portion of a first material and into contact with at least a portion of a second material, said second material being dissimilar from said first material; and
  - passing an electrical current through said welding member and said second material to fuse said welding member and said second material.
2. The method as recited in claim 1, further comprising:
  - providing said welding member with an enlarged portion so as to trap said first material between said enlarged portion and said second material.
3. A method of joining dissimilar materials, said method comprising the steps of:
  - placing a first component against a second component at a predetermined joining location, wherein the first and second components are composed of dissimilar materials;
  - driving a self-piercing rivet through said first component and into said second component to mechanically attach said first component to said second component at said joining location;
  - passing an electrical current through said self-piercing rivet and said second component at said joining location to fuse material at interfaces of at least said rivet and said second component; and
  - stopping the flow of electrical current to solidify the fused material and form a welded bond between at least said rivet and said second component.
4. The method as recited in claim 3 comprising passing said electrical current by contacting said rivet with a first electrode and contacting said second component with a second electrode at a second surface opposite

said joining location and using said electrodes to pass said current through said rivet and second component.

5. The method as recited in claim 3 comprising engaging said first component at said joining location with an electrode assembly comprising a first electrode and a hollow cylindrical electrode tool, said tool being adapted to encompass said rivet and said first electrode and to exert a clamping force on said first component;

engaging said second component at said second surface with a second electrode adapted to conform to said second surface for clamping and electrical contact; and

using said electrodes to pass said current through said rivet and second component, said current flowing around or through said second component from said second surface to said joining location located at said interface.

6. The method as recited in claim 3 comprising engaging said first component at said joining location with an electrode assembly comprising a first electrode and a hollow cylindrical electrode tool, said tool being adapted to encompass said rivet and said first electrode and to exert a clamping force on said first component;

engaging said second component at said second surface with a second electrode adapted to conform to said second surface for clamping and electrical contact;

placing said rivet in said electrode tool and driving said rivet through said first component and into said second component with said first electrode; and

using said electrodes to pass said current through said rivet and said second component.

7. A method of joining a non-ferrous component to a ferrous component, said method comprising the steps of:

pressing said non-ferrous component against one surface of said ferrous component at a predetermined joining location using a first electrode assembly to press against said non-ferrous component and a second electrode against another surface of said ferrous component;

driving a self-piercing ferrous rivet through said non-ferrous component using said first electrode and at least into contact with a wall of said ferrous component at said joining location to mechanically attach said non-ferrous component to said ferrous component; and

passing an electrical current through said electrodes, said ferrous rivet, and said ferrous component at said joining location to fuse at least said ferrous rivet to said ferrous component; and

stopping the flow of electrical current to form a welded bond between at least said rivet and said ferrous component.